LHC IR Upgrades Workshop, October 2005
Questions for Working Group 2

Issues for wire compensation at RHIC

1. What currents and beam wire separations are required to compensate 1 bunch in each ring?

2. Is cooling required with the currents to be used? If yes, how will the cooling be done?

3. Over what range is the wire movable? The wire should be no closer than 3 sigma. Does the wire pose an aperture restriction at small distances from the beam?

4. In the case of a magnet failure, can the beam hit the wire? Is the wire adequately protected?

5. How should the effectiveness of the compensation be monitored?

6. How much machine study time should be requested for wire compensation of 1 bunch in one ring? For compensation of 1 bunch in both rings? For compensation of several bunches? Time scale of these experiments ?

7. What do simulations predict for the compensation?

Challenges for wire compensation at RHIC

1. Sensitivity to non-round beams

   Question: Can the aspect ratio at the parasitic be changed, either by changing the ratio of β_y^*/β_x^* or by changing the ratio of transverse emittances e.g by scraping ?

2. Sensitivity to phase advance errors between the parasitics and the wire

   Question: Is there a trim quad or another means by which the phase advance to the wire can be changed ?

3. Tune dependence of the compensation - RHIC tunes are close to the LHC tunes

   Question: Is it necessary to investigate the tune dependence in RHIC - over what range?

4. Sensitivity to tune spread of the bunch.

   Beams in RHIC and LHC will have different tune footprints. Is the compensation sensitive to this footprint? e.g does space charge induced tune dependence on amplitude matter? Do the different rates of emittance growth in RHIC and LHC matter?

5. Sensitivity to alignment errors

   Question: How do we quantify the sensitivity of the compensation to alignment and the precision with which the beam-wire separation should be set ?

6. Sensitivity to current jitter

   Question: How large an inductance is necessary to damp the high frequency noise in the wire (close to the betatron frequency) ?

7. Sensitivity to optics errors

   Spurious dispersion and local sources of coupling close to the wire may change the efficiency of the compensation.

   Question: Should we attempt to create sources of optics errors such as in RHIC? If yes, a) what are the important optics errors that can spoil the compensation and b) can these optics errors be created in RHIC ?

8. How important is it to use pulsed wires for compensating the PACMAN bunches, i.e. is it known that average compensation is not good enough for these bunches?

   If pulsed wires are required, what is the right frequency (¡¡ 40MHz, the bunch repetition frequency)? Will such modulators and power supplies be available in FY07?

Electron lenses at the LHC

1. Can 1 or more electron lenses be useful for the LHC? Under what beam conditions?